ATENT COOPERATION TR .TY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

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PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Rule 71.1)

Date of mailing *(day/month/year)*	31.03.2005

Applicant's or agent's file reference	IMPORTANT NOTIFICATION
E-1961/03	

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/EP 03/51112	29.12.2003	30.12.2002

Applicant
DAYCO EUROPE S.R.L. ET AL

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.

2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.

3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

The applicant's attention is drawn to Article 33(5), which provides that the criteria of novelty, inventive step and industrial applicability described in Article 33(2) to (4) merely serve the purposes of international preliminary examination and that "any Contracting State may apply additional or different criteria for the purposes of deciding whether, in that State, the claimed inventions is patentable or not" (see also Article 27(5)). Such additional criteria may relate, for example, to exemptions from patentability, requirements for enabling disclosure, clarity and support for the claims.

Name and mailing address of the international preliminary examining authority:	Authorized Officer
European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx 31 651 epo ni	Jülich, G Tel. +31 70 340-3935

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
E-1961/03		
International application No.	International filing date (day/month/year)	Priority date (day/month/year)
PCT/EP 03/51112	29.12.2003	30.12.2002

International Patent Classification (IPC) or both national classification and IPC

F16H7/12

Applicant

DAYCO EUROPE S.R.L. ET AL

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 8 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the opinion
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
29.07.2004	31.03.2005
Name and mailing address of the international preliminary examining authority:	Authorized Officer
European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tlx 31 651 epo nl Fax: +31 70 340 - 3016	Goeman, F
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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/EP 03/51112

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:

Description, Pages

1, 2, 4-13	as originally filed
2a, 3, 3a	received on 24.02.2005 with letter of 24.02.2005

Claims, Numbers

1-7	received on 24.02.2005 with letter of 24.02.2005

Drawings, Sheets

1/4-4/4	as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).

   ☐ the language of publication of the international application (under Rule 48.3(b)).

   ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   ☐ contained in the international application in written form.

   ☐ filed together with the international application in computer readable form.

   ☐ furnished subsequently to this Authority in written form.

   ☐ furnished subsequently to this Authority in computer readable form.

   ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

   ☐ the description, pages:

   ☐ the claims, Nos.:

   ☐ the drawings, sheets:

5. ☐ This report has been established as it (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-7
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-7
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-7
	No:	Claims	

2. Citations and explanations

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Reference is made to the following documents:
   D1: WO 00/77422 A (SCHAEFFLER WAELZLAGER) 21 December 2000 (2000-12-21)

2. The document D1 is regarded as being the closest prior art to the subject-matter of claim 1, and discloses on page 12, paragraph 2 (the references in parentheses applying to this document): A two-arm belt tensioner for a belt drive, comprising: a fixed portion (32), designed to be fixed to a supporting structure; a first arm (7) and a second arm (8), carried by said fixed portion (54) and hinged thereto about a common axis; a first pulley (20) and a second pulley (21), mounted idle on respective ends of said arms (7,8) and designed to co-operate with respective branches (23a, 23b) of a belt (23) of said drive; and elastic means (14), which force said arms (7,8) towards one another to maintain said pulleys (20, 21) in contact with said respective branches (23a, 23b) of the belt (23), said arms (23, 24) comprise respective first arrest elements, which are designed to interact with said fixed portion (32) to define respective first positions of arrest of said arms (7,8) under the action of said elastic means (27), and respective second arrest elements, which are designed to interact with said fixed portion (32) to define respective second positions of end-of-travel of said arms (7,8) under the action of the pull of said belt, said fixed portion (32) comprising a base plate, a pin fixed to said plate and defining said common axis.

   The subject-matter of claim 1 differs from this known tensioner in that said fixed portion includes an appendage fixed to said base plate and defining an element of contrast for said first and second arrest elements of said arms.

   The subject-matter of claim 1 is therefore new (Article 33(2) PCT).

   The problem to be solved may be regarded as to make a simple base plate. The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons: Although an appendage defining an element of contrast for said first and second arrest

elements of an tensioner arm is known, using the same appendage for both tensioner arms is not known from nor is it rendered obvious by any available prior art document.

Claims 2-5 are dependent on claim 1 and as such also meet the requirements of the Articles 33(2) and 33(3) PCT with respect to novelty and inventive step.

3. The document D1 is regarded as being the closest prior art to the subject-matter of claim 6, and discloses on page 12, paragraph 2 (the references in parentheses applying to this document): A belt drive for connecting a reversible electric machine (2) to an engine shaft of an internal combustion engine, said electric machine (2) being operable as an electric machine for starting said internal combustion engine or a generator, said drive comprising: at least one first pulley (24) fitted on the engine shaft of said internal combustion engine; a second pulley (18) fitted on a shaft of said electric machine (2); and a belt (23) wound around said pulleys (18, 24), said belt (23) comprising: a first branch (23a) and a second branch (23b) set respectively between said first pulley (18), and said second pulley (24) and between said second pulley (24) and said first pulley (18) in the direction of motion of the belt (23) itself; and a two-arm (7,8) belt tensioner, which comprises: a fixed portion (32), designed to be fixed to a supporting structure; a first arm (7) and a second arm (9), carried by said fixed portion (32) and hinged thereto abort a common axis; a first pulley (20) and a second pulley (21), mounted idle on respective ends of said arms (7,8) and designed to co-operate respectively with said first branch (23a) and with said second branch (23b) of said belt (23); and elastic means (14), which force said arms (7,8) towards one another to maintain said pulleys (20, 21) in contact with said respective branches (7, 8) of the belt (23); said arms (7,8) comprise respective first arrest elements, which are designed to interact with said fixed portion (32) to define respective first positions of arrest of said arms (7, 8) under the action of said elastic means (14); and respective second arrest elements, which are designed to interact with said fixed portion (32) to define respective second positions of end of travel of said arms (7,8) under the action of the pull of said belt (23) said fixed portion (32) comprising a base plate, a pin fixed to said plate and defining said common axis of rotation of the two arms.

The subject-matter of claim 6 differs from this known tensioner in that said fixed

portion includes an appendage fixed to said base plate and defining an element of contrast for said first and second arrest elements of said arms.

The subject-matter of claim 6 is therefore new (Article 33(2) PCT).

The problem to be solved may be regarded as to make a simple base plate. The solution to this problem proposed in claim 6 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons: Although an appendage defining an element of contrast for said first and second arrest elements of an tensioner arm is known, using the same appendage for both tensioner arms is not known from nor is it rendered obvious by any available prior art document.

Claim 7 is dependent on claim 6 and as such also meet the requirements of the Articles 33(2) and 33(3) PCT with respect to novelty and inventive step.

WO-A-00/77422 discloses a belt tensioner including a fixed portion, a first and a second arm hinged to the fixed portion about a common axis and carrying respective idle pulleys, and a spring biasing the arms towards one another to maintain the pulleys in contact with respective branches of a transmission belt.

Stop means are provided to limit the travel of each arm both in the direction of the spring force, so as to define an assembly position of the arms, and in the opposite direction to prevent overtravel of the arms under dynamic pull variations of the belt.

DISCLOSURE OF INVENTION

An object of the present invention is to provide an improved tensioner of the type briefly discussed above, which has a simplified structure in particular regarding the fixed portion.

~~DISCLOSURE OF INVENTION~~

The purpose of the present invention is ~~to~~ obtain a two-arm belt tensioner of the ~~type~~ briefly described above, which is particularly simple and compact, easy to install and ~~to~~ handle prior to installation on the ~~engine, and convenient to install on the engine itself.~~

The above purpose is achieved by a two-arm belt tensioner for a belt drive, comprising: a fixed portion, designed to be fixed to a supporting structure; a first arm and a second arm, carried by said fixed portion and hinged thereto about a common axis; a first pulley and a second pulley, mounted idle on respective ends of said arms and designed to co-operate with respective branches of a belt of said drive; and elastic means, which force said arms towards one another to maintain said pulleys in contact with said respective branches of the belt, ~~said belt tensioner being characterized in that~~ said arms ~~comprise~~ comprising first arrest elements, which are designed to interact with said fixed portion to define respective first positions of arrest of said arms under the action of said elastic means, and respective second arrest elements, which are designed to interact with said fixed portion to define respective second positions of end-of-travel of said arms under the action of the pull of said belt.

~~BRIEF DESCRIPTION OF THE DRAWINGS~~

~~For a better understanding of the present~~

said fixed portion comprising a base plate and a pin fixed to said plate and defining said common axis of rotation of the two arms, said belt tensioner being characterised in that said fixed portion includes an appendage fixed to said base plate and defining an element of contrast for said first and second arrest elements of said arms.

BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of the present

CLAIMS

1. A two-arm belt tensioner for a belt drive (1), comprising: a fixed portion (21), designed to be fixed to a supporting structure (22); a first arm (23) and a second arm (24), carried by said fixed portion (21) and hinged thereto about a common axis (A); a first pulley (25) and a second pulley (26), mounted idle on respective ends (60, 61) of said arms (23, 24) and designed to co-operate with respective branches (15a, 15b) of a belt (15) of said drive (1); and elastic means (27), which force said arms (23, 24) towards one another to maintain said pulleys (25, 26) in contact with said respective branches (15a, 15b) of the belt (15), ~~said belt tensioner being characterised in that~~ said arms (23, 24) ~~comprised~~ comprising respective first arrest elements (37, 47), which are designed to interact with said fixed portion (21) to define respective first positions of arrest of said arms (23, 24) under the action of said elastic means (27), and respective second arrest elements (38, 39; 48, 49), which are designed to interact with said fixed portion (21) to define respective second positions of end-of-travel of said arms (23, 24) under the action of the pull of said belt (15).

~~2. The belt tensioner according to Claim 1, characterized in that~~ said fixed portion (21) ~~comprises~~ comprising (30) a base plate (30), a pin (31) fixed to said plate (30) and

defining said common axis (A) of rotation of the two arms (23, 24), said belt tensioner being characterised in that said fixed portion (21) includes an appendage (32) fixed to said base plate (30) and defining an element of contrast for said first and second arrest elements (38, 39; 48, 49) of said arms (23,24).

2. The belt tensioner according to Claim 1, characterized in that said at least one of said first and second arrest elements (38, 39; 48, 49) of said arms (23, 24) comprises a radial projection (47, 38, 48), which extends from the respective arm (23, 24) and is designed to interact with said appendage (32) of said fixed portion (21).

3. The belt tensioner according to Claim 2, characterized in that at least one of said arms (23, 24) comprises a hub (34), which houses at least partially said base plate (30) and is provided with an opening (36), through which there comes out said appendage (32), at least one of said arrest elements (37) being defined by an end contrast element delimiting said opening (36).

4. The belt tensioner according to any one of the preceding claims, characterized in that said first and second arrest elements (38, 39; 48, 49) are provided with respective buffers (39, 49) made of elastic material for absorbing the impact with said fixed portion (21).

5. The belt tensioner according to any one of the preceding claims, characterized in that said elastic

means comprise a spiral spring (27) and in that one of said arms (24) comprises a cup-shaped hub (45), which houses said spring (27), said spring (27) being constrained, with its own outer end (40), to said hub (45) and, with its own inner end (44), to the other arm (23).

67. A belt drive (1) for connecting a reversible electric machine (4) to an engine shaft (6) of an internal-combustion engine (2), said electric machine (4) being operable as an electric machine for starting said internal-combustion engine (2) or as generator, said drive (1) comprising: at least one first pulley (7) fitted on the engine shaft (6) of said internal-combustion engine (2); a second pulley (8) fitted on a shaft (9) of said electric machine (4); and a belt (15) wound around said pulleys (7, 8), said belt (15) comprising: a first branch (15a) and a second branch (15b) set respectively between said first pulley (7) and said second pulley (8) and between said second pulley (8) and said first pulley (7) in the direction of motion of the belt (15) itself; and a two-arm belt tensioner (20), which comprises: a fixed portion (21), designed to be fixed to a supporting structure (22); a first arm (23) and a second arm (24), carried by said fixed portion (21) and hinged thereto about a common axis (A); a first pulley (25) and a second pulley (26), mounted idle on respective ends (60, 61) of said arms (23, 24)

and designed to co-operate respectively with said first branch (15a) and with said second branch (15b) of said belt (15); and elastic means (27), which force said arms (23, 24) towards one another to maintain said pulleys (25, 26) in contact with said respective branches (15a, 15b) of the belt (15); ~~said belt drive being characterized in that~~ comprising said arms (23, 24) ~~comprise~~ respective first arrest elements (37, 47), which are designed to interact with said fixed portion (21) to define respective first positions of arrest of said arms (23, 24) under the action of said elastic means (27), and respective second arrest elements (38, 39; 48, 49), which are designed to interact with said fixed portion (21) to define respective second positions of end-of-travel of said arms (23, 24) under the action of the pull of said belt (15); -> see page 18

7~~8~~. A belt tensioner according to Claim 6, characterized in that said elastic means (27) have a rigidity calculated so as to bring about a rotation of each arm (23, 24) of the tensioner (20) up to the respective second position of arrest in the presence of a maximum value of tension of the respective branch of the belt.

<said fixed portion (21) comprising a base plate (30), a pin (31) fixed to said plate (30) and defining said common axis (A) of rotation of the two arms (23, 24), said belt drive being characterised in that said fixed portion (21) includes an appendage (32) fixed to said base plate (30) and defining an element of contrast for said first and second arrest elements (38, 39; 48, 49) of said arms (23, 24).>